

REMARKS**Summary of the Office Action**

Claims 9-16 stand rejected under 35 U.S.C. § 101 as claiming the same inventions as claims 1-8, respectively, of prior U.S. Patent No. 6,628,599.

Claims 1-8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kowarz et al. (U.S. Patent No. 6,335,831) (hereinafter "Kowarz") in view of Wang et al. (U.S. Patent 6,211,993) (hereinafter "Wang").

Summary of the Response to the Office Action

Applicants have added new claims 17-22 to differently describe embodiments of the disclosure of the instant application's specification. Claims 9-16 were previously canceled at page 2 of the Divisional Application transmittal form as filed on July 23, 2003. Accordingly, claims 1-8 and 17-22 are currently pending for consideration.

Rejection under 35 U.S.C. § 101

Claims 9-16 stand rejected under 35 U.S.C. § 101 as claiming the same inventions as claims 1-8, respectively, of prior U.S. Patent No. 6,628,599. It appears that this rejection was made in error because claims 9-16 were previously canceled at page 2 of the Divisional Application transmittal form as filed on July 23, 2003. Accordingly, withdrawal of the rejections under 35 U.S.C. § 101 is respectfully requested.

Rejection under 35 U.S.C. § 103(a)

Claims 1-8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kowarz in view of Wang. This rejection is respectfully traversed for at least the following reasons.

With respect to claims 1-8, the Examiner states at page 3 of the Office Action that

Kowarz (figure 10, not drawn to scale) is interpreted as disclosing a variable optical element comprising a reference medium 58, a first area 55b and a second area 64b being formed on the top surface of the reference medium, wherein optical changes are imparted on the wavefront of light made incident onto the first and the second areas to reflect the light based on changes in optical characteristics of the first and the second areas caused by electrostatic force, wherein diffraction efficiency is changed for the light made incident on the first and the second areas based on the phase changes in the first and second areas (col. 8, lines 17-54).

Applicants respectfully traverse this interpretation because Kowarz's first area 55b and second area 64b bring about changes in optical characteristics caused by electrostatic force. Neither of these areas bring about changes in optical characteristics caused by a piezo-electric effect of a piezo-electric medium layer in the manner recited in the claims of the instant application.

Applicants respectfully submit that this is because, in Kowarz's device, electrostatic force is generated within the space of a channel 67 between a bottom conductive layer 56 and a deformable ribbon element 72. See, col. 7, lines 14-17 of Kowarz. The first area 55b of the ribbon element 72 is defined by abutting against a standoff 61 under the electrostatic force. See col. 7, lines 57-66 of Kowarz. A plurality of heights of these standoffs 61 define multilevels of

the ribbon elements such as 55b and 54b. The standoff 61 is necessary for first area 55b because of moving a ribbon element 72_{L4a3} from a first top level 64b to a second intermediate top level 55b, for example, as shown in Figs. 9 and 10 of Kowarz.

The Office Action concedes that “Kowarz is interpreted as disclosing all the claimed limitations except for a piezo-electric medium layer on the first area.” As discussed in more detail below, the Office Action then applies Wang as curing these deficiencies.

Applicants respectfully submit that a piezo-electric medium layer could not be substituted for the standoff 61. However, even assuming, strictly arguendo, that such a substitution could take place, the space on the standoff 61 would prevent the application of voltages or electrical fields for the mechanical stress (distortion) in the piezoelectric materials. In addition, even if the space on the standoff 61 could be filled with piezoelectric materials, Applicants respectfully submit that it would be impossible to function as a device because ribbon elements hardly move on the contiguous surface of piezoelectric materials.

MPEP § 2143.01 clearly sets forth that if the “proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).”

Nevertheless, even assuming, strictly arguendo, that such a combination of references could be made, Applicants respectfully submit that there is still no second area without the piezo-electric medium layer, as recited in the combination of independent claim 1.

Applicants respectfully submit that although Kowarz discloses that it is clear that a person skilled in the art can imagine other ways for actuating the variable optical element, for

example, thermal actuation, piezoelectric actuation or any combination (col. 6, lines 62-67), Applicants note that Kowarz merely teaches a wish list of “other ways” including the use of a piezoelectric actuation for moving the ribbon elements 72 in a simple multilevel mechanical grating device. However, Kowarz provides no detailed description of the piezoelectric actuation in any respect.

In addition, Applicants respectfully submit that the generated electrostatic force between the bottom conductive layer 56 and the ribbon element 72 in Kowarz does not change the optical characteristics of the ribbon elements in Kowarz’s device. Applicants note that electrostatic force is merely used for abutting and holding the ribbon elements 72 onto the standoffs 61 respectively. See col. 8, lines 7-16 of Kowarz. The changes of optical characteristics of the ribbon elements are dependent on the discrete heights of standoffs 61 in Kowarz’s device.

However, in the embodiments of the disclosure of the instant application, the changes in optical characteristics of the first area having a piezo-electric medium layer and the second area without a piezo-electric medium layer are caused by the piezo-electric effect of the piezo-electric medium layer. Accordingly, Applicants respectfully traverse the Office Action’s interpretations of Kowarz for at least the foregoing reasons.

Furthermore, the Examiner states at page 3 of the Office Action that

Wang (figure 1) is interpreted as disclosing the teaching of a piezoelectric medium layer 104 that changes in the thickness as a result of a piezoelectric effect corresponding to voltages externally applied (col. 5, lines 12-21).

Applicants respectfully submit that Wang discloses a solid state device for amplitude modulation comprising a transparent electrically conductive layer 102, a thin film ferroelectric 104 deposited on the conductive layer, and a second transparent conductive layer 105 deposited on the thin film ferroelectric as shown in Figure 1. The thin film ferroelectric 104 may be of any type which exhibits an electro-optic effect such that the index of refraction changes or which exhibits a piezoelectric effect such that the thickness changes when an electric field is applied. See col. 3, lines 59-65 of Wang.

Applicants respectfully submit that Wang utilizes the change of refraction index and optical thickness of material reparably Lead lanthanum zirconium titanate (PLZT) for the thin film ferroelectric 104 while reflecting and transmitting the incident light with the thin film ferroelectric 104. As a result, not only the electro-optic effect and the piezoelectric effect is required, but also the transparency of the thin film ferroelectric 104 is also required as a material in Wang's device. On the other hand, Applicants respectfully submit that in embodiments of the disclosure of the instant application, there is no need to include such a combination of both the electro-optic effect and the transparency features of a piezo-electric medium layer in order to properly reflect the light.

In addition, Applicants respectfully submit that there is no description in Wang of a first area having a piezo-electric medium layer having a piezo-electric effect combined with a second area without a piezo-electric medium layer, with both of these first and second areas being formed on the top surface of the reference medium.

Applicants note that, according to embodiments of the disclosure of the instant application, a variable optical element is provide with a structure such that when light is incident

on the first and the second areas, it reflects the light imparting optical changes to its wave front based on changes in the optical characteristics of the first and the second areas caused by the piezo-electric effect of the piezo-electric medium layer. As a result, by controlling the piezo-electric effect of the piezo-electric medium layer it becomes possible to impart various optical changes to the incident light. This can be used, for example, to appropriately control optical characteristics of light beams irradiated onto an information recording medium for the purpose of recording or reproducing information. Applicants respectfully submit that this advantageous effect is not obtained by the combination of Wang's and Kowarz's devices.

Furthermore, Applicants respectfully submit that Wang and Kowarz, whether taken separately or in combination, do not provide any motivation to combine the multilevel mechanical grating device and the piezo-electric medium layer to make a variable optical element. Absent any teaching or suggestion in Kowarz on how to physically adapt the piezoelectric actuation using the teachings of Wang to meet the features recited in the combinations of independent claims 1 and 5, Applicants respectfully submit that the rejection under 35 U.S.C. § 103(a) is improper.

Accordingly, Applicants respectfully assert that the rejections under 35 U.S.C. § 103(a) should be withdrawn because neither Kowarz nor Wang, whether taken singly or combined, teach or suggest each feature of independent claims 1 or 5. MPEP § 2143.03 instructs that "[t]o establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 409 F.2d 981, 180 USPQ 580 (CCPA 1974)."

Furthermore, Applicants respectfully assert that dependent claims 2-4 and 6-8 are allowable at least because of their dependence from claims 1 or 5, and the reasons set forth above.

Newly-Added Dependent Claims 17-22

Applicants have added new dependent claims 17-22 to differently describe embodiments of the disclosure of the instant application's specification. These claims are in condition for allowance at least because of their dependence on claims 1 or 5 and the reasons set forth above.

CONCLUSION

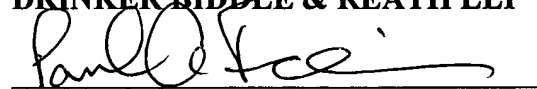
In view of the foregoing, Applicants submit that the pending claims are in condition for allowance, and respectfully request reconsideration and timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution. A favorable action is awaited.

EXCEPT for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. § 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account No. 50-0573. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3).

Respectfully submitted,

DRINKER BIDDLE & REATH LLP

By:



Paul A. Fournier

Reg. No. 41,023

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Customer No. 55694

DRINKER BIDDLE & REATH LLP

1500 K Street, N.W., Suite 1100

Washington, DC 20005-1209

Tel.: (202) 842-8800; Fax: (202) 842-8465